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Silk Filaments' Shape and Size Cause

Two-Tone Dyeing*

By F. A. MENNERICH†

IN the dyeing of knitted silk fabrics the appearance of slight color differences in adjoining sections of the same fabric is of frequent occurrence, and the cause of sub-standard merchandise and great financial loss. In silk stockings the trouble is exhibited by a sharp demarcation between the leg and foot portions.

It is commonly stated that differences in shade are due to chemical causes, such as differences in soaking, age, oxidation, bacterial action, tinting, natural color and nature. To obviate two-tone from these causes strict uniformity of lots and similarity of treatment have been repeatedly recommended and practiced. Despite all precautions taken in uniform soaking, tinting, uniformity of yarn and stitch formation, classification according to natural color, feel, or hardness, and despite all attempts made to correct the trouble by the addition of selective wetting agents in the dye bath, two-tone still persists in developing due to some inherent physical quality of the raw silk.

DISCOVERY OF PRINCIPAL CAUSE OF TWO-TONE

For five months I tried to find a leveling agent which would eliminate two-tone dyeing. Oils, soaps, solvents and numerous chemicals were tried, but none of them proved successful. They would not level out the inherent two-tone.

After hundreds of failures, I began to doubt whether two-tone was really due to chemical differences. I came to the conclusion that the real cause must be in physical differences of the silk filaments.

When the silk filaments were examined from a cross-section at 500 diameters, there seemed to be a difference in the shape and size of the filaments. The difference in shape was obtained from the diameter ratio, which is defined as the ratio of the minor to the major diameter of a filament at a given cross-section. It was found that two-tone was produced when there was a difference of 0.04 in the diameter ratios.

Except in rare instances, variation in shape is not noticeable to the eye by microscopic examination. Ordinarily the unlikeness is too slight to be noticed in cross-section, except by statistical measurements, even though extremely visible as two-tone dyeing in knitted fabric.

It is peculiar that two-tone dyeing is usually not noticeable when the light- and dark-dyeing silks are examined in skein form, whether in the raw, after tinting, or after boiling-off and dyeing. Two-tone is usually noticeable only at the line of demarcation between adjacent light and dark panels. If a string is held so as to cover this line of demarcation the difference in hue seems to disappear.

EXPERIMENTAL PROCEDURE

After the raw silk is degummed or the color stripped from dyed stockings a small bundle of filaments is selected and adjusted to size by a special thread sizer. In cross-sectioning, the bundle is drawn through a tiny hole in a thin metal plate by means of a fine wire loop. The projecting ends of silk are cut off with a sharp razor blade flush with the two smooth faces of the metal plate. The metal plate is mounted upon the stage of a compound microscope strongly illuminated by the substage mirror with transmitted light from a bright carbon arc lamp. The image of the cross-section is projected at a magnification of 500 diameters upon a ground glass screen ruled co-ordinately. Measurements of the diameters are made on the ground glass by means of a small transparent celluloid scale with special graduations, so that both the minor and major diameters may be read directly in microns with one setting of the scale.

FACTORS AFFECTING SHAPE AND SIZE OF FILAMENTS

It has been recognized that silk from different breeds of silk worms, and different seasons and climatic conditions show characteristic dye absorption. Through the

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courtesy of Mr. C. Walter Seidel, selected cocoons were obtained from the Sericultural Institute of Nakano. The data show that, for the particular cocoons tested, the shape varied with the breed, and within the same breed of cocoons varied with the latitude. Also it was apparent that the spring yellow silk was flatter than the spring white, and that the spring cocoon filaments were larger. There was a 40 per cent variation in the shape of the filaments and a 20 per cent variation in the size.

RELATION OF TWO-TONE TO OTHER PROPERTIES

From a limited number of observations, two-tone dyeing showed no consistent relationship to:

1. Feel of raw silk skeins.
2. Color of raw silk skeins.
3. Hardness, as determined by incline plane serigraph.
4. Exfoliation of raw silk.

Attempts were made to discover some relationship among all possible combinations of the following five properties, but no relationship whatsoever was found between any two of these properties: hardness, tenacity, mean diameter, diameter ratio and exfoliation.

EFFECT OF SHAPE AND SIZE OF FILAMENTS UPON TWO-TONE DYEING

In stockings, which showed no two-tone dyeing, the differences in diameters and diameter ratios was negligible. In analyzing the causes of two-tone dyeing, it was found that differences in shape accounted for 65 per cent of the cases and that another less important factor entered the picture, namely, the size or mean diameter of filaments.

Taking a difference in diameter ratio of 0.03 as sufficient to produce two-tone dyeing, it was found that the consistency of results was 65 per cent. If a difference in mean diameter of 0.7 was taken as sufficient to produce two-tone dyeing, the consistency was 45 per cent. When both differences were considered, 0.03 for diameter ratio and 0.7 micron for mean diameter, the consistency was 90 per cent.

When all the variables involved and many other possible causes of two-tone are considered, the remarkable consistencies, with no relation existing between shape and size, seem to prove conclusively that the shape and size of the filaments are characteristic for different lots of silk and markedly affect the shade of dyeing.

Forty ten-bale lots were examined to determine the average shape and size of the filaments and their variations within and among different lots. The results are based on more than 50,000 measurements. Two-thirds of these lots could be selected as showing no two-tone within the ten-bale lots. One-fourth of the lots could be chosen as showing no two-tone either within the same lot or among different lots.

RESUME

1. One principal cause of two-tone dyeing is due to differences in shape and size of the silk filaments in adjoining sections of fabric.
2. A difference of 0.03 in diameter ratio or a difference of 0.7 micron in mean diameter is sufficient to produce two-tone dyeing.
3. The flatter and larger filaments dye darker than the rounder and smaller filaments.
4. Silk from different breeds, and possibly from various seasons and districts, are characterized by a difference in shape and size of the filaments.
5. The discovery that differences in shape and size of filaments produces two-tone should make obvious the futility of attempting to correct for two-tone by any chemical adjustments in soaking, boiling-off and dyeing when such differences exist.
6. No consistent relation was found between two-tone dyeing and other properties, such as color of raw silk, feel, hardness and exfoliation.
7. No relationship was found among such properties of raw silk as diameter ratio, mean diameter, exfoliation, hardness and tenacity.
8. By grading raw silk according to shape and size of filaments, two-tone dyeing can be minimized if ten-bale lots are so selected as to show a variation of less than 0.03 in diameter ratio and less than 0.7 micron in mean diameter. By routing ten-bale lots in throwing so that consecutive lots do not exceed this variation, about two-thirds of all lots can be used with nearly complete elimination of inherent two-tone dyeing.

It is recognized that certain variations in soaking, knitting and weaving may cause two-tone, but this discussion deals with a principal cause which is beyond the control of throwster, knitter or weaver except as the raw silk itself is selected for uniformity in shape and size of filament.

1936 SPRING WOOLEN CARD

The regular edition of the 1936 Spring Woolen Card, portraying 48 shades, was recently released to members. Two special collections, one highlighting pastels and the other vivacious hues, are especially intended for Southern resort, cruise and sports wear, as well as for contrasting accents.

In the classification of basic colors, there are outstanding new notes, including the cornflower types of blue, chaudron and capucine hues, greyish reseda and bluish pottery greens, rich candy brown, ruby and raspberry tones. Grey is represented in neutral shades of light and medium value, which find a dashing contrast in the smart chaudron or copper kettle hue. The latter also supplies a new accent to town costumes in navy, black or green, as well as to sports clothes in white and the natural peasant linen tone.

Tests to Determine

Durability and Resistance to Water of Certain Umbrella Fabrics*

By VIOLA SYKES† with KATHERINE CRANOR

INTRODUCTION

UMBRELLAS have been used for centuries as protection from either rain or sun. The literature reviewed gives little indication of any research having been done on umbrella fabrics. The consumer of today has few guides by which to judge the durability and the resistance to water of the umbrella which she purchases.

A need for such information is greatly felt at the present time. On account of the recent introduction of various attractive and cheaply made umbrellas on the market, the consumer who wants both beauty and serviceability is at a loss to know how to make a wise selection.

This investigation has been an attempt to test certain umbrella fabrics on the market today as to their durability and their resistance to water. It is hoped that the findings may be of some value to the consumer in the selection of umbrellas.

EXPERIMENTAL

The umbrella fabrics used in this research were one plain weave cotton, two twill weave cottons, two plain weave silk and cotton mixtures, one plain weave rayon, and three plain weave silks. The original fabrics were given a chemical and physical analysis.

The number of yarns per inch was determined by means of the Lowinson thread counter. The number of both warp and filling yarns per inch was counted in five different places on the fabric, six inches apart and not less than one inch from the selvage. The averages were recorded as the number of yarns per inch.

Thickness of the fabrics was determined by means of a micrometer. Ten measurements of the thickness of each fabric were taken on different parts of the cloth, within six inches of the selvage and the average thickness in inches was calculated.

The diameter of the yarn was determined by means of a micrometer. Ten measurements of the diameter of both warp and filling yarns were taken and the average diameter was calculated.

The twist of yarn was determined by means of the Precision Twist Counter. Five determinations of the number of twists per two-inch length of both warp and filling yarns were made and the average per one-inch length was calculated.

The strip method was used in testing breaking strength and elongation, which were determined by means of the Scott Universal Tester. Samples of fabric 1x7 inches, of both warp and filling, were cut within one inch of the selvage. No two samples included the same set of warp and filling threads. Five determinations of both warp and filling were made and the average breaking strength calculated in pounds and the average elongation in inches.

Folding endurance was determined by means of the Massachusetts Institute of Technology Folding Endurance Tester. Five samples one centimeter wide and 15 centimeters long were cut from the warp of each fabric. A tension of 1.5 pounds was applied throughout the test. The number of double folds each sample made before breaking was recorded, and the average folding endurance was calculated.

Breaking strength, elongation, and folding endurance were run under standard conditions of temperature (70° ± F.) and humidity (65 per cent ± relative humidity).

Tests for surface waterproofing were made by placing a few drops of water on the fabric. If they formed round globules which ran back and forth without wetting the fabric, it has been surface waterproofed. The degree of surface waterproofing was estimated and rated very good, good or fair.

Funnel Test No. I

Twelve-inch square specimens of the fabrics were each placed on large paper towels, folded in the form of a funnel, and placed in 5 inch glass funnels which were stood in glass flasks. 300 cc. of distilled water were then poured into each funnel.

Funnel Test No. II

Twelve-inch squares of the fabrics were crumpled, soaked in distilled water at room temperature for 24 hours, and dried in an oven at 45° C. for 24 hours. They were then conditioned under standard conditions of temperature and humidity for one hour, folded within a paper towel, and placed in 5-inch glass funnels which were stood in glass flasks. 300 cc. of distilled water were then poured into the funnels.

The points noted in both funnel tests were the amount

*Contribution from the Department of Textiles & Clothing, Iowa State College.

†This paper is the experimental portion of a Master's thesis submitted by the junior author in part fulfillment for the degree of Master of Science.

TABLE I
Fabric Analysis

Fabric	Weave	Yarns Per Inch Warp	Yarns Per Inch Filling	Thickness Inches	PHYSICAL Diameter of Yarn Inches Warp	PHYSICAL Diameter of Yarn Inches Filling	Twist Per Inch Warp	Twist Per Inch Filling	Breaking Strength Pounds Warp	Breaking Strength Pounds Filling	Elongation Per Cent Warp	Elongation Per Cent Filling	Folding Endurance Double Folds Warp	Type of Fiber Warp	Type of Fiber Filling	CHEMICAL Quantitative Analysis % Ash	CHEMICAL % Weighting	Qualitative Analysis of Ash	
1. Cotton	Plain	81.8	86.0	.0080	.0028	.0028	24.4	17.7	24	39	2.9	5.4	14000+	Cotton	Cotton	1.495	0	Copper Aluminum	Dextrin Gums
2. Cotton	Twill	104.2	200.6	.0056	.0022	.0026	33.4	31.6	29	42	2.5	4.0	14000+	Cotton	Cotton	1.150	0	Copper Aluminum	
3. Cotton	Twill	91.0	81.2	.0059	.0026	.0023	28.6	9.9	42	41	3.0	5.4	14000+	Cotton	Cotton	1.480	0	Aluminum	
4. Cotton and silk	Plain	97.4	95.4	.0048	.0006	.0018	1.5	13.5	22	37	6.2	3.1	4872.8	Silk	Cotton	0.645	0	Aluminum	
5. Cotton and silk	Plain	43.8	81.4	.0046	.0005	.0020	1.2	9.4	11	39	3.7	3.0	2860.6	Silk	Cotton	0.605	0	Aluminum	
6. Silk	Plain	151.0	99.0	.0031	.0008	.0009	13.4	29.0	34	33	6.8	4.8	4595.8	Silk	Silk	35.130	40.885	Tin, Aluminum, Phosphates, Silicate	
7. Silk	Plain	141.6	102.8	.0029	.0007	.0008	25.2	7.4	44	28	6.1	3.1	6948.8	Silk	Silk	31.425	36.215	Tin, Phosphate, Silicate, Aluminum	
8. Silk	Plain	123.4	102.0	.0029	.0005	.0008	12.1	2.2	26	25	6.1	4.8	8644.0	Silk	Silk	16.730	16.730	Iron, Aluminum Chromium, Phosphate	
9. Acetate and nitrate rayon	Plain	98.4	78.0	.0052	.0013	.0014	3.2	2.3	10	20	4.1	9.2	2237.0	Cellulose acetate rayon	Cellulose nitrate rayon	0.550	0	Aluminum	

of wetting of the paper towels and the amount of water which had dripped into the flasks at the end of 6 hours.

Edge-breaking Test

Samples of fabrics, 6x6 inches, were stretched at a high tension over the sharp edge of a board and allowed to remain for five days exposed to atmospheric conditions. The resistance of the fabric to breaking was estimated.

Fastness to Light

Specimens of the fabric, 4¾x2¾ inches, were put in swatch holders and placed in the openings of the cylinder of the Fade-Ometer. The humidifier was filled with water, the cylinder and the canvas curtain which covers the swatch holders were put in place, and the fan and violet carbon arc light were turned on. The specimens were exposed to the light for forty hours which was equal to twenty days averaged for the months of March, April, and May, Chicago, latitude 41° 50′ N. The amount of fading was estimated.

Weathering

Specimens of fabrics were placed in wooden frames and directly exposed to the weather for 1,501 hours from June 18 at 8:00 p.m. until August 19 at 9:00 a.m. Loss of color was noted and the specimens were tested for breaking strength and elongation, folding endurance, edge breaking, and water resistance.

TABLE II
Surface Waterproofing

Fabric	*Rating*
1. Cotton	Very good
2. Cotton	Very good
3. Cotton	Good
4. Cotton and silk	Fair
5. Cotton and silk	Very good
6. Silk	Very good
7. Silk	Very good
8. Silk	Very good
9. Acetate and nitrate rayon	Very good

CHART 1

Breaking strength of umbrella fabrics

Temperature 70°±F. Relative Humidity 65%±

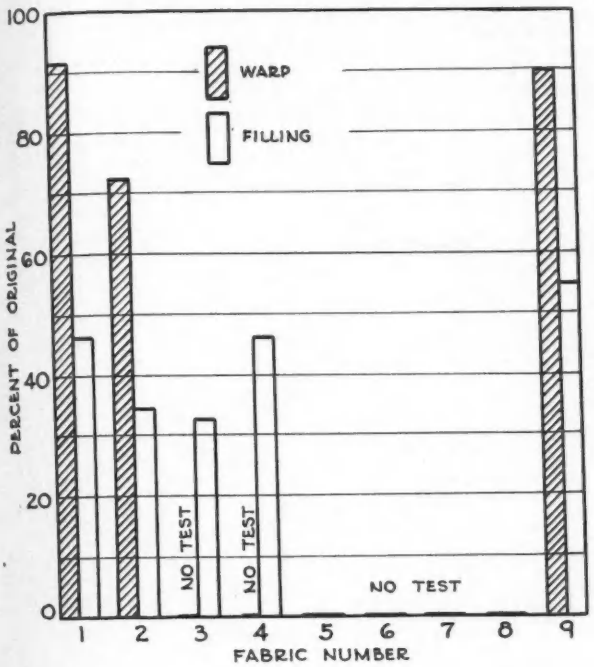


CHART 2

Elongation of umbrella fabrics

Temperature 70°±F. Relative Humidity 65%±

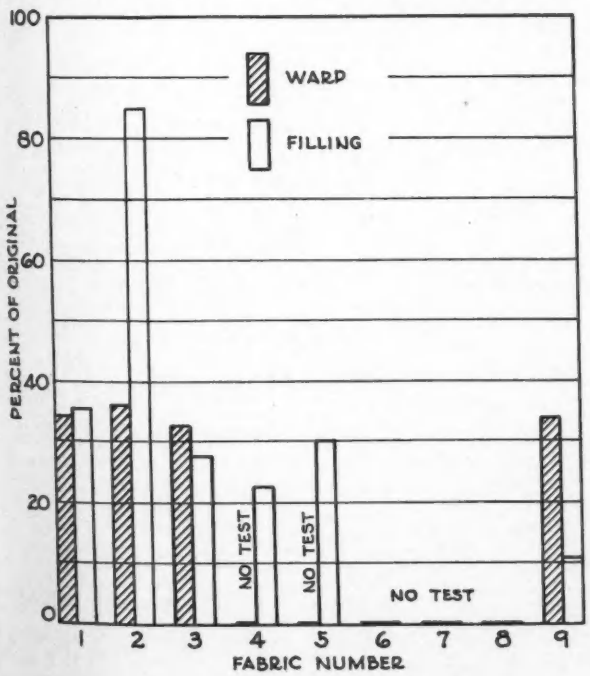
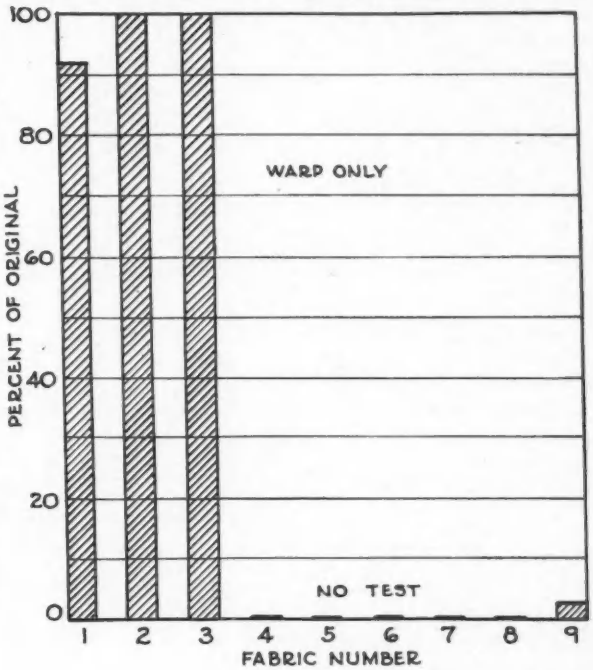


CHART 3

Folding endurance of umbrella fabrics

Temperature 70°±F. Relative Humidity 65%±



SUMMARY AND CONCLUSIONS

1. All of the fabrics tested contained aluminum. This would indicate that the aluminum soap method was used in waterproofing.
2. The degree of surface waterproofing did not seem to be determined by the amount of ash contained in a fabric.
3. The original cotton fabrics averaged higher in breaking strength, warp folding endurance, and resistance to water than any of the fabrics tested.
4. Of the weathered fabrics, cotton had the greatest resistance to folding endurance and edge-breaking.
5. The original fabric which ranked lowest in the edge-breaking test, also had the lowest number of yarns per inch. This fabric was a cotton and silk mixture.
6. The silk fabric having the least amount of weighting was more resistant to folding endurance and weathering than the other silk fabrics. The one having the greatest amount of weighting resisted edge-breaking to a greater extent than any of the fabrics tested.
7. The weathered silk fabrics deteriorated to such an extent that they could not be tested for breaking-strength and elongation, folding endurance, water resistance, and edge-breaking.
8. All of the weathered fabrics were low in water resistance and lost in color after one thousand five hundred and one hours of exposure.
9. The data obtained from this research would indicate that closeness of weave, thickness of fabric, diameter

CHART 4

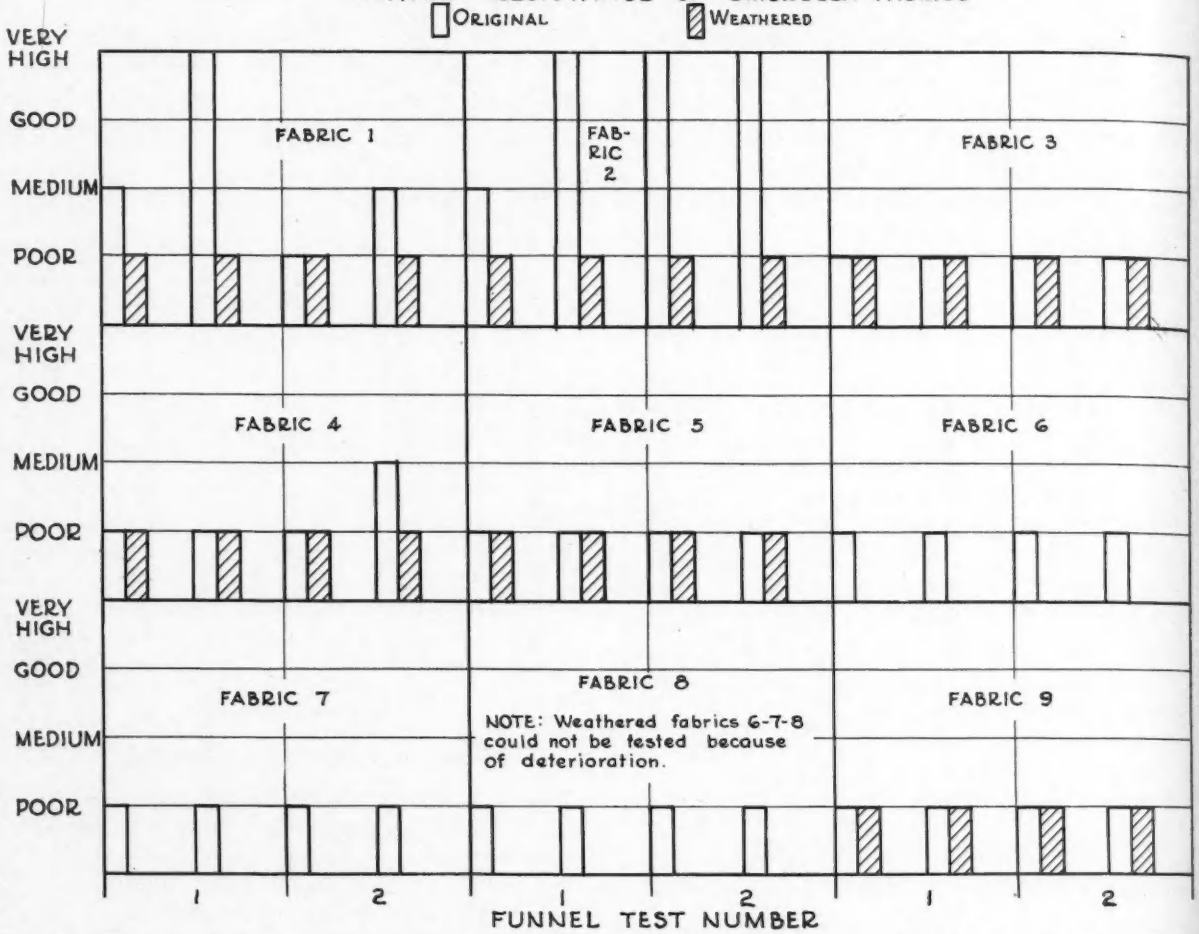


TABLE III

Resistance to Breaking

TIME OF EXPOSURE—5 DAYS

Fabric	Number of Samples	Original: No Effect	Original: Threads Slightly Pulled	Original: Threads Greatly Pulled	Original: Threads Broken	Weathered: No Effect	Weathered: Threads Slightly Pulled	Weathered: Threads Greatly Pulled	Weathered: Threads Broken
1. Cotton	3	0	3	0	0	0	3	0	0
2. Cotton	3	0	3	0	0	1	2	0	0
3. Cotton	3	0	3	0	0	2	1	0	0
4 Cotton and silk	3	0	3	0	0				
5. Cotton and silk	3	0	0	3	0				
6. Silk	3	3	0	0	0				
7. Silk	3	2	1	0	0				
8. Silk	3	0	3	0	0				
9. Acetate and nitrate rayon	3	0	3	0	0	0	0	0	3

NOTE: Weathered fabrics 4, 5, 6, 7, and 8 could not be tested for edge-breaking because of great deterioration.

of yarn, and twists per inch influenced water resistance. They would also indicate that the silk and rayon fabrics tested had least durability and were lowest in water resistance.

SELECTED BIBLIOGRAPHY

1. Adams, W. H. The waterproofing of textile fabrics. Textile World, 57: 3779-81. 1920.

2. Adams, W. H. Waterproofing cotton fabrics. Melliand, 4: 552-54. 1930.

3. Barr, Guy. The action of light on textiles. Color Trade Jr. and Textile Chemist, 15: 176-77. 1924.

4. Bennett, F. P. and Co., Inc. A cotton fabrics glossary. 2nd ed., pp. 726-27, 597-98. F. P. Bennett and Co., Inc., Boston. 1914.

5. Cole, G. S. Cole's encyclopedia of dry goods. Rev. ed., pp. 558-62. Roat, New York, 1900.

6. Dooley, W. H. Textiles. Rev. ed., pp. 164, 370. D. C. Heath and Co., Boston. 1924.

TABLE IV
Fastness to Light

Fabric	Number of Samples	Fade-Ometer			Exposure During Edge-breaking 120 Hours			Exposure in Frames 1,501 Hours		
		Fast	Faded	Extremely Faded	Fast	Faded	Extremely Faded	Fast	Faded	Extremely Faded
1. Cotton	3	3	0	0	3	0	0	0	3	0
2. Cotton	3	3	0	0	3	0	0	0	3	0
3. Cotton	3	0	3	0	0		3	0	0	3
4. Cotton and silk	3	3	0	0	3	0	0	0	3	0
5. Cotton and silk	3	3 S	0	3 C	3 S	0	3 C	0	0	3
6. Silk	3	0	3	0	0	0	3	0	0	3
7. Silk	3	0	0	3	0	0	3	0	0	3
8. Silk	3	3	0	0	0	3	0	0	3	0
9. Acetate and nitrate rayon	3	3	0	0	3	0	0	0	0	3

S = Silk
C = Cotton

7. Griffith, M. E. The influence of laundering and exposure to light upon some wash silks used for outer garments. Ohio. Agr. Exp. Sta. Bulletin 506. 1932.
8. Grove-Palmer, Fred. Rayon rainproofs. Textile Colorist, 50: 742-45, 843-45. 1928.
9. Halstead, W. W. A textile guide for retail distributors. p. 204. Benn, Ltd., London. 1929.
10. Harold, J. F. X. Report of sub-committee on water proofness of fabrics. American Association of Textile Chemists and Colorists. Year Book, 1933: 170-176; 1934.
11. Hays, M. B. Methods of testing waterproofed fabrics. Jr. of Home Ec., 22: 675-79. 1930.
12. Heerman, P. Effect of ultra-violet rays. Textile World, 67: 4150-55. 1925.
13. Howe, H. E. Waterproofing textiles. Scientific American, 122: 138. 1920.
14. Johnson, G. H. Textile Fabrics. pp. 312-14. Harper and Bros., New York. 1927.
15. Martin, D. M. Waterproofing—the history of and present day methods. Am. Dyestuff Reporter, 21: 184-88. 1932.
16. Pearson, H. P. Waterproofing textile fabrics. pp. 11-12. Chemical Catalog Co., New York. 1924.
17. Pearson, H. P. Waterproofing textile fabrics. Am. Dyestuff Reporter, 14: 885-87. 1925.
18. Rice, George. Waterproofing umbrella cloth, awnings and raincoats. Dyer and Calico Printer, 50: 60-61. Feb. 1, 1928.
19. Rolfe, E. Testing the quality of waterproofed textile fabrics. Am. Dyestuff Reporter, 21: 535-36. 1932.
20. Schoffstall, C. W. Resumé of the year's textile research at the Bureau of Standards. Textile World, 72: 2729-33. 1927.
21. Small, C. P. How to know textiles. pp. 285-86. Ginn and Co., Boston. 1925.
22. Stony, Margaret. Individuality and clothes. p. 331. Funk and Wagnals Co., New York. 1930.
23. Turner, A. J. The relation between atmospheric humidity and the breaking strengths and extensibilities of textile fabrics before and after weathering. Jr. Textile Institute, T101-68. 1928.
24. Woolman, M. S. Textiles. 2nd ed. rev. p. 304. Macmillan Co., New York. 1926.

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• SILVER ANNIVERSARY OF ONYX

The Onyx Oil & Chemical Co., Jersey City, N. J., brought to a close its twenty-fifth year in business, with a gala Silver Anniversary banquet, held on December 28th, 1935, at the Hotel Edison, New York City.

Featuring the evening, was the presentation of handsome Sterling Silver plaques to the co-founders of the Onyx company, Victor H. Berman and Richard Von Oesen. The plaques were presented by Dr. Philip Kaplan, Chief Chemist, as expressions of esteem from the entire body of workers, all of whom contributed to the cost.

James H. Tully, vice-president of the Onyx company, officiated as Toastmaster. Mr. Berman, president, opened the banquet with a speech of welcome and appreciation of the loyalties and services of his co-workers.

In keeping with the Silver Anniversary, special presentations were made for long and meritorious service with the company. Elgar A. Brick was presented with a suitable remembrance by Mr. Berman, in honor of twenty-five years of faithful service. Dr. Philip Kaplan also was honored for twenty-five years service and William Farley for his twenty-year period of service, both presentations being made by Mr. Von Oesen.

Presentations of awards to winners in the sales contest held among the sales representatives, were made by Charles D. Ehrengart, Secretary and Sales Manager.

First prize was won by Edward Klumph, southern representative; second prize was awarded to Jack Tresize, New York and New England representative. First prize in the midwestern area, went to Paul Wilgeroth, of the Maher Color & Chemical Co., Inc. In a special Effort Contest, Leon P. Brick, Middle Atlantic States representative, took first place award.

Various talks of the evening brought out many interesting facts in the history of the Onyx company, stressing the growth, progress and accomplishments that it attained in its twenty-five years of business life.

A fine program of entertainment rounded out the event.

Technical Notes from Foreign Sources

Scientific Principles Involved in Bleaching of Vegetable Fibers

M. Jaffard—TIBA 11, 167 (1933).—The last section of the paper. The present installment has principally to do with the bleaching of weaves.

The author thoughtfully recalls that woven goods are subjected to a good many manipulations in succession—kiering, washing, souring, bleaching, washing, and souring again, and that the fibers are by this time only slightly lignified (they have already been well purified from the grosser impurities of the natural fiber), and that they are more susceptible to the action of chlorine, so that it ought to be possible to attain a bleach superior to what is generally met with. The successive stages permit a more complete elimination of the still adherent impurities, together with a gentler treatment than before. As the alkaline baths necessary in the regular sequence of operations penetrate the fiber more easily than the actual bleaching liquors, it is easier to tender the parts of the goods where the fibers have been thus rendered more defenseless toward attack. The sourings have always the purpose of eliminating the soda and the calcium salts, which would not simply wash out, and which would cause local retardation of bleaching and of washing, and of dyeing also. The repetition of treatment with alkali also permits the elimination of the reductive oxycellulose constituents of the weave, which would cause yellowing of the goods on drying or storing, or inequalities in the absorption of dyestuff if the goods were to be dyed.

Under the subtopic of bleaching with hydrogen peroxide, metallic peroxides, and persalts, some careful discussion and some interesting facts are included. For example, the author considers hydrogen from the standpoint of a very weak acid, dissociated into peroxide and hydrogen ions, whose constant of dissociation is intermediate between that of hypochlorous acid and that of water. Equilibrium between ion concentration and neutral molecular concentration is reached at a pH of 11.62. But it is the ion which is more unstable in solution, while with hypochlorous acid it is the acid molecule, not the ion, which is relatively unstable. In fact, hydrogen peroxide is not stable except in acid solution. Practically, it is stabilized by addition of either a weak acid or weak base, such that, acting as a buffer, they will hold the pH value within the limits of stability. In using hydrogen peroxide, commonly stabilized with sulfuric acid, either ammonia or sodium silicate is added in suitable amounts.

When peroxide of sodium is employed, its solution is first acidified with sulfuric acid, and then the pH value of the solution brought into the proper range by addition of either of these two reagents just mentioned, or by addition of magnesium sulfate to the alkaline solution, the magnesium hydroxide formed, a weak and only slightly soluble base, acting as buffer. Perborate is stabilized by magnesia, or by sodium silicate, after neutralization.

Weber recommends a pH of 6.8 to 8 4 for hydrogen peroxide bleaching. The author states that this figure is far too low; Brandt recommends a value of 10 to 12. At all events, the addition of ammonia in quantity equivalent to the peroxide would give a pH of 10.4, and the author has found in practical recipes a still greater quantity of ammonia recommended.

The action of hydrogen peroxide upon incrustations of the fiber is much less energetic in the cold than that of hypochlorous acid. Increase of temperature increases the energy of reaction, and the temperatures usually employed are much higher than with bleaching with hypochlorite; between 50°-80° C., and sometimes as high as 90° C. The reactions are solely those of oxidation. The water formed by the breaking down of the peroxide in the course of its reaction having a pH of 7, and the organic acids formed by oxidation of the incrustants being weak acids, the pH is only slightly varied by the progress of the bleaching, especially when the bath is buffered well, by ammonia, magnesia, or, best of all, sodium silicate.

The cellulose is little attacked, if at all, by hydrogen peroxide, though the peroxide can, under proper conditions, be used deliberately to prepare oxycellulose. Some authors consider perborate as very dangerous in this connection. But as to hydrogen peroxide, since it can be effectively buffered, a given set of conditions known to be favorable can be maintained with a little care, while the pH of hypochlorous acid varies constantly, quite beyond control. The chief advantages in using hydrogen peroxide is that it works well in alkaline medium and at a fairly high temperature.

Some notice is also given of bleaching upon grass (brief remarks) and by means of potassium permanganate (rather briefly).

—— ♦ ——

Vat Dyestuffs (Anthraquinone Series)

German Patent No. 495,367 (*April 7,* 1930)—*I. G. Farben-Ind. A.-G.*—The process here described consists, in general, in the conversion of anthanthrone or its derivatives, directly or indirectly, into iodo-derivatives, these being in some cases further halogenated.

In one example, anthanthrone itself, obtained by heating 1-1'-dinaphthyl-8-8'-dicarbonic acid with sulfuric acid, is heated with monohydrate to 120° C., and iodine gradually added with stirring, in the course of one hour, the mixture being then further heated and stirred for an hour, then cooled, poured upon ice, and the product filtered off. It is essentially a mono-iodo-anthanthrone, some of whose solubility characteristics are given.

(Continued on page 740)

PROCEEDINGS OF THE
American Association of Textile Chemists and Colorists

DECEMBER 30, 1935

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Members should notify the **Secretary** immediately of all address changes

MEETING, SOUTHEASTERN SECTION

THE fall meeting of the Southeastern Section was held November 9, 1935, at the Piedmont Hotel, Atlanta, Georgia, at 7:00 P. M. The usual dinner preceding the meeting was served to fifty members and guests.

The meeting was called to order by Chairman C. A. Jones, who introduced the first speaker, S. I. Parker, of the Ciba Co.

Mr. Parker delivered a very interesting paper, "A General Outline of Textile Printing," and at the conclusion of this, introduced R. J. Nuttall, of Lanett Bleachery & Dye Works, who supplemented this paper with an interesting account of his experiences in textile printing, both in this country and in Brazil.

C. B. Ordway, Alabama Polytechnic Institute, Chairman of the Sub-Committee on Mercerization, next gave a report of the meeting held in Chattanooga in August, and the plans formulated there for the research being carried on by this committee. Mr. Ordway then introduced Sidney Edelstein, the fellowship appointee, who is conducting this work, and who gave a brief outline of the progress made on the study so far.

Mr. Jones called attention to the Annual Meeting of the National Association at Chattanooga, Tenn., December 6 and 7, and urged as many from this Section as could to attend.

Harold Schroeder and R. S. Wheeler of the South Central Section, who were in attendance, gave a summary of the plans and program for this annual meeting, cordially extending an invitation to each one to be present.

Respectfully submitted,

W. F. CRAYTON, *Secretary.*

CALENDAR OF COMING EVENTS

Meeting, Philadelphia Section, Broadwood Hotel, Philadelphia, Friday, January 17, 1936. Speakers: Joseph Razek, University of Penn., "The Physical Measurement and Specification of Color"; S. W. Fernberger, University of Penn., "Some Psychological Aspects of Color."

* * *

Meeting, New York Section, Elm Golf Club, Paterson, N. J., Friday, January 31, 1936.

* * *

Annual Meeting, Providence, R. I., December 4 and 5, 1936.

Proceedings of the American Association of Textile Chemists and Colorists

Solka, The Purified Cellulose

*Its Development, Characteristics and Application to Industry**

By C. S. KAUFFMAN†

THE formidable array of names in the roster of your association makes me hesitate somewhat to speak before you. Bear in mind that I am not a technical man, but am bringing you a story from the layman's point of view; and from a consumer's point of view you are all chemists and research men working on products and ideas. After those products have been developed there always comes the next important question "What of it?" "What is the value of this new idea, or this new product?" It is that phase of Solka which I will present to you tonight.

Solka is a product of research, a product that has been developed through painstaking research, long experiments, and trial and error. Solka can be truly classified as a discovery, a discovery that, to my mind, will be far-reaching. It is already established as an amazing development applicable to 32 major industries and hundreds of different products. A peculiar factor of Solka is that it is not only a discovery of a raw material, but actually a discovery of a new method of selling and a new way of introducing quality and sales into a market that has been dominated by price and chiseling.

To digress for a moment, it is interesting to us as New Englanders to know that this discovery was made right here in New England. After all some of the most ingenious discoveries and developments have been from this section of the country. The ingenuity and craftsmanship have led the way more than once in years past and will undoubtedly do so again in years to come. Almost invariably these Yankee developments have been on the quality side. Solka is no exception. It is an unusual product; it makes unusual products and offers unique methods of selling.

Let's drop back a moment into history. The search for cellulose began over 2,000 years ago. The Chinese started it. At about the same time the Egyptians, without any collaboration with their distant brothers, also began the search. Those ancients took papyrus, reeds and bark and pounded them into a pulpy mass, washed out the loose particles and pressed the pulpy mass into a sheet that when dry made a fairly satisfactory writing surface and a product that could be used instead of parchment which had always been made from skins. You can see that the law of supply and demand was at work thousands of years ago. These crude scientists were seeking a new product to take the place of an expensive material then available.

These early craftsmen had no idea that they were working with Alpha cellulose. They were not aware of the fact that Alpha cellulose is a base material of all plant life. It was probably by accident that the craftsmen later discovered that cotton and linen would give them far more satisfactory results. When these new raw materials were utilized there was probably no knowledge whatsoever that the cotton was 96% to 98% pure Alpha cellulose as provided by nature.

In the early part of 1700 a really intensive effort began to find cellulose in some other form. A review of the history of this period shows some very interesting and unique attempts to utilize leaves, grasses, rushes, and almost every type of plant life,—all without success. Not until 1850, after chemistry was fairly well established, was there any scientific attempt to solve the problem of getting an adequate supply of cellulose. By that time it was established that the fibers in a tree were essentially in the same type of construction as cotton. The only trouble was that these Alpha Cellulose fibers in the tree were surrounded by resin, lignine, sap and other cellulose, —all of which were difficult to remove. Someone, however, got the brilliant idea of taking the tree and putting it up against the grindstone, spreading out the resulting mass of fibers and forming a sheet of paper. This was the first wood pulp ever produced, and the first practical application of the use of cellulose on a large scale.

The problem was now isolated. The next question naturally arose "Can we now purify this fiber?" The answer came in the development of the chemical processes whereby the fibers from the tree are cooked, and the impurities removed. Various processes were now introduced known as sulfite, soda, and sulfate. Each of these contributed substantially to the progress of the industry in the search for cellulose.

You will notice in all of this progress the cellulose that was obtained was utilized almost exclusively by the paper-making industry.

(Skip 8 pages)

*Presented at meeting, R. I. Section, February 22, 1935.
†Brown Co., Portland, Me.

Along about 1920, immediately following the world war, the first heavy demand for purified cellulose arose in another field. It was at this time that rayon was actively promoted in the American market. All of the processes then utilized depended upon highly purified Alpha cellulose for their manufacture. The one outstanding source of supply was cotton linters, an expensive raw material. The rayon industry approached Brown Company, the largest manufacturer of purified fibers in the market, to see whether the company's extensive research laboratories could secure a highly purified cellulose from the tree. It was simple enough to ask the question, but quite another matter to secure the answer. However, the research engineers tackled the subject, and thus began the search for ways and means of purifying the fiber from the tree. At that time it was thought that 92% or 93% Alpha cellulose was sufficient. From a technical point of view, that objective was almost impossible to achieve, but it was a challenge and it was met.

The company actually produced 92% purity, and more. The process was continued until today Alpha cellulose is now obtainable in all degrees of purification up to and including 98% purity.

The chemists discovered that every step of purification, and the various processes utilized, produced different fibers, each with unique characteristics. Here, then, was a group of fibers, each with qualities of its own, that could be manipulated and blended in hundreds of ways to produce the vast variety of qualities, and products. Not only was this raw material good for rayon, but the characteristics discovered were desirable in other fields. From that point began a search for uses for this amazing discovery.

At the start of this talk we mentioned Solka. Bear in mind that is the name of the Brown Company fibers, and applies to a group of fibers ranging all the way from 93% to 98% pure Alpha cellulose. In the various products that have since been produced you will notice that in some cases the products have unusual strength, in others just the opposite, amazing softness. In one toughness, rigidity; in another, flexibility. These products have all been produced from a base material and have been obtained by use of different fibers, and by manipulating and blending.

Rather than to give you a long story as to how the various products were developed, let me show you some of the outstanding materials which are now in use in the commercial field.

Here is an innersole made from Solka. The fibers have been put in a web form and then spot welded through Latex impregnation, to produce a material that is outstanding for shoes. Notice that the innersole is flexible, firm, very strong and tough. It also will not crack or turn brittle under rapid changes of temperature and moisture. This is a quality of chemical inertness that is inherent with all of the Solka fibers. We will also discover as we go along that there are a few qualities that seem to dominate in all Solka; namely, strength, purity and durability. There is also a fourth quality that is prominent in many of the fibers,—absorbency. These basic qualities are present in practically every one of the fibers in various degrees. In the innersole which you have just seen, the factor of absorbency plays a very important part. The Latex actually penetrates right through to the core, thoroughly impregnating the fiber, and giving the unique characteristics which you have seen.

As Solka is scientifically manufactured and the process is controlled, the final innersole is uniform in its characteristics, and can thus be manufactured by the thousands and the millions, to exact specifications.

There is another quality that appeals to the wearer. The innersole molds readily to the foot, yet will not stretch or get out of shape.

The fibers have been combined in another combination to produce the upper stock, which you see on the finished shoe, and the counter which is inside and hidden from view. The sock lining and the quarter lining are also made from Solka. Each different product has characteristics of its own that lend themselves to the particular use for which they are intended.

Here you see a piece of cloth made from Solka. From the distance at which you now sit it appears to be no different from some linen or cotton fabric with which you are all well acquainted. These fibers have been specially prepared, twisted into yarn and woven into cloth. Notice the brilliant colors. This is an example of where absorbency plays an important part. The yarn readily accepts the dye which penetrates to the core, giving the final brilliant colors. Basically, these yarns are known for their high strength, and controlled stretch—there is no secondary stretch—and unusual abrasive qualities and toughness. This field is still comparatively new. Tremendous strides have been made within the past few months. Undoubtedly considerable more progress will be made as the company proceeds in its experiments on other yarns.

Notice this piece of cloth which I am now holding. This has been printed and not woven. Here again the absorbency factor plays a very important part. The inks are readily accepted and you get this unique and outstanding impression of the ink, producing the effect of a woven rather than a printed cloth.

Another field in which Solka has been widely used is the moulded plastics. For a number of years the Bakelite moulded plastics have been on the market, and, as you will recall, almost all of these early moulded plastics were in black, brown and dark colors. With the development of some of the resins and other perfections in this industry, an entirely new line of plastics known as the Urea plastics have been developed. Solka played an important part

in this field. It is white, or colorless, as the chemists say, has chemical purity, and also has color stability; that is, it will withstand the pressure and heat of moulding, and will also withstand the light and sun rays without discoloration. Solka has aided the industry in developing white, cream, or light colors, and all brilliant colors. There is another factor; namely, translucency that is possible only in this particular group of moulded plastics made from Solka.

You will notice in all of these exhibits that I have not shown you one paper as yet. I have done that purposely so that you can see that Solka is by no means a common variety of wood fiber, but something unique and different. Naturally, it has been used in the paper trade, just as cotton and rags have been used for years. It has played an important part in developing papers of unusual strength, whiteness, permanency, and in some instances, has added mellowness and texture.

The company has also developed an unique process known as wet strength which you see exemplified in this towel. Here is an absorbent sheet of paper that actually absorbs the water without going to pieces. As a matter of fact, it can actually be washed in soap and water and still remain intact. This is what we call wet strength, and it is a patented process developed by the company. It is now applied to a wide variety of papers and base fibers in producing a product that will withstand moisture, oil, or whatnot, and actually retain, and in some cases actually increase its strength when wet.

At the beginning of the talk I mentioned the fact that Solka is not only an amazing development in a discovery of a raw material, but also is a new means of selling. Every one of these points that I have mentioned can be dramatically or graphically demonstrated. For example, if a salesman is endeavoring to interest someone in his innersole, he can rely upon the cloth which I have just shown you, or the poker chip, to explain his points of strength, purity and toughness, and then translate those points directly to the innersole, thus dramatically and graphically portraying the qualities in his innersole which he is selling.

Sometimes a product, such as this towel which I have just shown you, has points of demonstration within itself and needs no reference to other products. It is a very simple matter to actually take the towel and wash it in soap and water, and thus present to the buyer the salient facts and the outstanding qualities. All sales managers are constantly looking for something new to talk about. Solka gives them the newness, and also gives qualities which can be demonstrated and proved in the dramatic and interesting fashion which I have just shown you.

In view of the fact that Solka is a quality raw material, it is naturally used in quality products. When it comes to selling quality products you always need "reasons why", and Solka gives that "reason why".

I could go on almost indefinitely giving you examples of products that are made from this highly purified cellulose, and could carry on indefinitely with actual demonstrations. Let me close by summarizing: Here is a unique discovery of research engineers and chemists, a raw material that can be utilized in an almost endless number of products of different industries, producing better products which can be sold by visual demonstration and unique methods of proof. What you have seen here is merely the beginning. This is an age of cellulose. New and interesting articles made from this amazing raw material will undoubtedly be produced in ever increasing numbers.

MEETING, PHILADELPHIA SECTION

THE Philadelphia Section held a meeting Friday evening, November 22, 1935, at the Broadwood Hotel, Philadelphia.

The usual routine business was concluded and followed by a report on the coming meeting at Reading, Pa., in February, 1936. This was presented by William Stringfellow.

Elmer C. Bertolet of the Philadelphia Textile School then offered an address on the school activities, which met with sincere appreciation.

Albert O'Hare of the George H. McFadden & Bros. Co. then presented an extremely interesting paper on raw cotton in relation to the handling from grower to the cotton merchant.

Attendance—83. Vice-Chairman Herbert S. Travis presided.

Respectfully submitted, R. W. DELANEY, *Secretary.*

MEETING, RHODE ISLAND SECTION

THE second meeting of the season was held on Friday evening, November 29th, at the Providence Engineering Society Building.

The meeting was called to order by Chairman Masson. It was voted that the chairman be instructed to appoint the necessary committees to make arrangements for the Annual Meeting of the Association to be held in Providence, December 4th and 5th, 1936.

E. R. Schwarz, assistant professor of textile technology at the Massachusetts Institute of Technology, gave an illustrated talk on "New Developments in Textile Microscopy." Special emphasis was laid on methods of cross-section mounting, the use of the three dimension or binocular microscope, methods of illumination for opaque objects, and the use of polarized light in the examination of fibers.

The meeting adjourned with a rising vote of thanks to Dr. Schwarz. Attendance—75.

Respectfully submitted, RAYMOND A. PINGREE, *Sec.*

AMERICAN
DYESTUFF
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HAPPY NEW YEAR

ACCORDING to the New Year's statement of Daniel C. Roper, Secretary of Commerce, the production of consumers' goods during 1935 was at or above the relatively high level of 1934; there was further improvement in agriculture; some revival in the durable goods industries; widespread improvement in consumer purchasing based on increased employment; more equitable price relationships and a larger harvest; improved industrial earnings; an increase in the value of our foreign trade; and further improvements in the financial field, including a rising tendency in security markets and a gradual reopening of the domestic capital market to the flow of private funds. Regardless of whether you are in accord with the above-mentioned items of improvement or not it is evident that business generally is in an improved condition.

The Secretary further indicates that this broadening of the recovery process "has been strikingly shown in several tendencies of the past year which have brought a substantial increase in the national income as a result of steady improvement through the consolidation of gains previously achieved and the gradual extension of the recovery movement. Whereas in the two preceding years the upward movement was interrupted by sharp recessions, in 1935 business was definitely established on a higher plane early in the year and the level was materially raised in the last quarter. The 1935 increase in production was based on meeting the immediate needs, rather than on such anticipatory purchases by manufacturers and distributors frequently evident in 1933 and 1934 necessitating a periodic slackening of the productive processes while stocks were being absorbed."

Although the Secretary does not mention it in his statement we think that another important change during the past year was a change in the attitude of many people from one of pessimism to one of optimism. This, we believe, will be of as much value toward further recovery as favorable figures and facts. The credit for the recovery which is in progress will be variously placed depending upon whether you believe that business has fared better through the aid of governmental functions or in spite of them. Regardless of where the credit belongs the forces of recovery which have been in effect apparently have a good chance of continuing.

To look forward into the new year and say definitely that such and such an event will take place is a task we will leave to others more fitted for such prognostications but we will take a chance and say that we believe 1936 will be a better business year than the one just past, basing this belief on the sound business foundation that has been gradually built up. Of course there are many events which could take place that might possibly have a serious effect on business. The presidential election is coming along, war clouds hover over Europe and the government is spending money in large quantities. How such conditions will eventually affect business will develop in the future. We hope that recovery is far enough advanced to take any unfavorable developments in its stride.

There is one element of concern which we feel should be stressed, and that is to hope that business has learned something during the past few years that will help to prevent another such depression as the one we are now emerging from or at least to soften the blow when it falls. Perhaps it will take several more depressions before we are able to solve this problem completely but we all must have learned something from this last one.

The new year will present many formidable problems but the tendency toward recovery should help us through them. The effects of recovery will be felt in the same way as the forces of depression—they will cover an ever widening circle. As far as solving the problem of unemployment, which still lingers to a large extent, the steady expansion of production and distribution during the past year should give hope for the future. There is undoubtedly a firmer foundation for sound business expansion during 1936 than there has been for the past few years.

All that remains to say is that we hope the end of 1936 will find you more prosperous than ever and that you will again be ready to say "Happy New Year."

Wool Dyeing*

Dyeing Methods and Formulas Employed with Various Colors

By C. H. YOUNG, M.Sc.

WOOL, as we all know, is an animal fiber—the same as pure silk—as distinct from cotton and viscose which are vegetable fibers. A third group represented by acetate silk, although a vegetable fiber, on account of its chemical behavior, forms a class by itself. The wool when taken from the sheep contains in its raw state, besides dirt, its natural fat containing impurities (wool sweat and wool fat), further mechanically attached parts of wood, straw and parts of plants.

The wool industry can be divided into four main branches, namely woolen yarn spinners, felt industry, worsted spinners, and shoddy. In the woolen yarn spinning mills, the wool is washed first and worked up in this condition. In the worsted spinning mills, the wool goes through the combing process which separates the short staple and only the long fiber is used up. The third branch, the felt industry, does not only use wool but also the hair of different animals such as rabbits, hares, goats, camels, and so forth; this industry produces articles such as wool and hair felt hat bodies, woolen felt for furniture, clothes, saddles and shoes. In the fourth industry, wastes from the afore-mentioned industrial branches are accumulated together with rags and old clothes. In other words, this is material which has once already gone through a manufacturing process.

WET FINISHING PROCESSES

In every branch of the woolen industry, the woolen material is scoured in the various manufacturing stages before reaching the actual dyeing process and good scouring of the material is essential to ensure satisfactory results later on in the dyeing.

Carbonizing: Mechanical impurities, such as particles of straw and wood, burrs, etc., are removed by the carbonizing process. This process consists of treating the loose wool or the pieces in a sulfuric acid bath of 4° to 5° Tw. and it has been found of advantage to add also a wetting-out agent. The goods are then hydro-extracted and dried at high temperature—175° to 212° F.—in a drying chamber or special appliances. After carbonizing, the goods naturally have to be washed thoroughly in running water and such material which has to be milled is neutralized for about one-quarter of an hour with the addition of a cold soda solution of 4° to 7° Tw. and finally rinsed with clear water. Very important in the carbonizing process is the wetting-out. Particular attention has to be paid that the material is thoroughly wetted-out in the carbonizing liquor and is uniformly hydro-extracted as otherwise carbonizing stains may occur. It is also essential that the impregnated goods are not allowed to lie too long before drying as this results in drying in parts, effecting uneven dyeings later on. The material also should be protected from direct sunlight or water-drops. In carbonizing pieces with cotton lists, the latter are protected from destruction by giving them, when entering the carbonizing oven, a soda solution thickened with clay or chalk or with silicate of soda.

Milling: The object of milling is to convert the loose fabric into the denser and more durable cloth. The milling process is based on the property of the wool fiber to felt when wet, especially in the presence of soap, alkali or acid and, when hot, under the influence of pounding or pressure (friction).

Alkali milling is carried out at a moderate temperature with as little liquor as possible for one to six hours, or longer, according to the kind of cloth, type of milling machine and desired milling effect. The milling agents are soap and soda solution, their strength depending on the character of the wool and the goods. Very dry and very hot milling is to be avoided, and the goods must also not remain in the soap too long. After the milling process the goods should be washed as soon as possible in order to remove the soap inside the wool.

The acid milling process is chiefly used for felt and hat bodies and berets. In this case, the milling agents are dilute sulfuric acid, acetic, lactice and formic acids. The milling process itself is the same as for alkali milling; the felting sets in more rapidly in acid milling than in alkali milling.

After milling, the goods must not lie too long as they may possibly become dry in parts resulting in uneven dyeings.

In some few cases, especially for light-weight dress-goods, milling without soap or acid, the so-called "water-milling," is sometimes sufficient.

Crabbing: Light-weight worsted pieces are liable to

*Summary of Paper given at the Summer School of the Canadian Association of Textile Colorists and Chemists, held in Hamilton on August 23rd, 1935. Reprinted from Canadian Textile Journal.

shrink or felt in dyeing and are, therefore, before dyeing subjected to the crabbing process. The pieces are passed full width into a cistern fitted with guide rollers wound, under pressure in boiling water, onto a roller and treated thus for ¾ hour. After crabbing, the goods are usually passed in the open width through cold water or left wound on the roller until cold.

Worsted pieces with heavily sized warps must be crabbed in a fresh liquor only. An addition of an assistant prevents the spinning oil from being fixed in the fiber and particular care has to be taken in this respect when low-grade oil is used.

Decatizing: Wet decatizing, in its severest form known as potting, imparts to heavy worsted and wool cloth a surface of maximum smoothness with a matt or high luster and prevents creasing and felting in the subsequent dyeing process. According to the degree of luster required, the pieces are treated with hot water in the trough or decatizing machine. The pieces are rolled on a beam and immersed in the trough and allowed to remain therein until cold. When working with the wet decatizing machine, boiling water is pumped through the beam pieces to obtain a high luster. The beam goods which are treated with cold water in the wet decatizing machine are steamed for 2 to 3 minutes according to the character of the goods. Dyed goods are subject to the wet decatizing or potting process at 160° to 195° F. according to local conditions. Consequently, dyestuffs of adequate fastness must be chosen and the dyestuff used for dyeing must possess corresponding fastness. Wet decatizing or potting at still higher temperatures than mentioned above are quite an exception and, in such cases, it is best to test the dyestuffs to be used as to their adequate fastness to potting at a temperature which comes into consideration.

After having prepared the wool, in other words freed it from impurities, oils, grease and so forth, we shall have to chose the best suitable dyestuffs which will answer the requirements for which the goods are used. For this reason, particularly the following points will have to be considered: whether the color levels well; fastness to light; fastness to washing; fastness to water; fastness to rubbing; fastness to sulfur stoving; fastness to perspiration; fastness to alkali; fastness to milling; fastness to decatizing; fastness to bleaching; fastness to carbonizing; fastness to sea-water.

DYESTUFFS AND DYEING METHODS

The dyeing methods of the different groups of colors are as follows:

In particular, susceptible and easily felting goods should be dyed as quickly as possible and from a strongly acid bath for which only dyestuffs with very good levelling properties should be chosen.

The acid colors requiring a strong acid dyebath are generally dyed with an addition of 10 to 20% Glauber salt crystals and 3 to 4% sulfuric acid 96% (168° Tw.) or the corresponding quantity, 8 to 10%, bisulfate of soda; the goods entered into the bath at 140 to 160° F., raised to the boil and boiled for ¾ to 1½ hours. In place of sulfuric acid, the same quantity of formic acid 85% can be used. Goods which are difficult to penetrate are entered at somewhat lower temperature which is then raised to the boil gradually and an agent used to ensure perfect penetration.

Generally speaking, dyestuffs which level readily are used for sensitive goods (light-weight dress-goods and zephyr yarns) where it is essential to preserve the texture of the fiber, the luster, etc.

Well scoured wool facilitates the dyeing. If one is not certain that the wool to be dyed is well scoured, it is advisable to pass the goods before dyeing, through a warm ammonia bath with the addition of 1½ to 3¼ oz. Leonil SB for every 100 lbs. of goods, followed by a moderate rinsing.

When shades with well leveling dyestuffs turn out too dark, they may be lightened or what we call "thinned down" by boiling the dyed goods together with undyed (white) material. In this case, some color will boil off the dyed material and go into the undyed goods. Another method is to run off part of the dye liquor and to replace it with fresh water, the dyebath being then raised to the boil and the boiling continued. If the divergence in shade is too great, the goods may be placed into a fresh bath set with Glauber salt and sulfuric acid and worked therein until they are up to shade, with or without the addition of further quantities of dyestuff, depending on the necessity.

Acid Bath: Dyestuffs which are dyed from a weakly acid bath and exhausted with sulfuric acid are used in the following way:

Enter the goods at 100 to 120° F. into the dyebath containing 3 to 5% acetic acid 30% and 10 to 20% Glauber salt crystals. Raise to the boil slowly and continue boiling for ½ to ¾ hour. If necessary, 3 to 5% acetic acid 30% or 1 to 2% formic acid 85% or 1 to 2% sulfuric acid 96% is then added gradually and the goods boiled for another ½ to ¾ hour. The acetic acid necessary to set the bath may also be replaced by one-fourth the amount of formic acid 85%. In machine dyeing, it is advisable to commence dyeing with 5 to 8% acetate or sulfate of ammonia and 1 to 2% acetic acid 30%, the subsequent addition of acid being, in most cases, unnecessary. Carbonized goods must be well neutralized before dyeing. On the other hand, it is well worth observing that when the weakly acid dyeing group of dyestuffs is used for shading, the dyebath must first be cooled down, the dyestuff added and the bath gradually brought again to boil.

Ammonia acetate which forms the deliquescent crystals can be prepared by mixing acetic acid and ammonia. For instance, to 105 ccs ammonia 25%, add 150 ccs acetic acid 50% and make up to 1 liter. Such a solution contains 100 grams ammonium acetate per liter and has a slightly alkaline reaction. On heating, ammonium acetate becomes decomposed and the solution becomes more and more acid. Owing to this property, ammonium acetate is used in wool

dyeing in order to effect the uniform and gradual acidifying of the dyebath in the case of these acid, chrome developed and mordant dyestuffs which do not level readily and which go onto the fiber too quickly. Instead of ammonium acetate, ammonium formiate is also recommended for wool dyeing and this offers against ammonium acetate the advantage over the latter that it evolves slowly, by boiling, a stronger acid and that the addition of sulfuric or formic acid which is mostly necessary when using ammonium acetate, is superfluous. In many cases, this very addition is considered troublesome because of the possibility of unlevelness. In laboratory tests we have found that 8 parts of ammonium formiate 50% are equal to 10 parts ammonium acetate 18° Tw. (49%). According to experiments, 8% ammonium formiate is suitably used in dyeing on the machine without any addition of Glauber salt. In case of dyestuff combinations which contain products to be exhausted with sulfuric acid, it is recommended to add from the very start to the above quantity of ammonium formiate, about 1% formic acid.

Resorcine dyestuffs are dyed from an acetic acid bath. Owing to the difficulties encountered in dyeing and the inferior fastness to light of these dyestuffs, the method is now only applied to a limited extent in cases where the beautiful and brilliant shades of the resorcine dyestuffs cannot be obtained by other means. The dyebath is set with:

10% acetic acid 30%
10% acetate of soda

and the dissolved dyestuff; enter the goods hand-warm, raise to 175° F. in ½ hour, and finish dyeing at this temperature in about 1 hour. Shades leveling difficultly should be dyed with less acetic acid and an increased quantity of acetate of soda.

An alternative method is as follows: Boil the goods with

3 to 5% alum
3 to 5% tartar, and
3 to 5% acetic acid 30%

for ½ hour; cool down to about 120° F., add the dyestuff, again raise to the boil and boil for another ¼ to ½ hour. If the bath is heated too quickly or the goods entered too hot or boiled too severely, unlevel and dull dyeings are apt to result. To ensure clear shades, the use of copper dyeing vessels should be avoided with both methods. When resorcine dyestuffs are dyed in conjunction with rhodamine, the latter must not be added until the former have been exhausted. For the exhaustion of the dyebath, a trace of acetic acid is added, if necessary.

Alkaline Bath: The dyestuffs applied by this method are chiefly used on account of their brilliant shades. Sensitive woolen goods are not generally dyed with alkali blue because the alkaline bath is very apt to impair the luster and the quality of the wool. Alkali Blue 6BF is, more or less, the only dyestuff that has to be dyed in the following way:

Set the dyebath according to the depth of shade desired with 2 to 4% borax and the dyestuff solution. Enter the goods at 140° F. and raise slowly to near the boil. After dyeing for ½ to 1 hour, rinse, and, in order to develop the shades, sour in a fresh bath for ¼ hour at 85 to 120° F. with 2 to 6% sulfuric acid. The warmer the acid bath, the redder will be the resultant shade. The developing bath must show an acid reaction. Instead of borax, ammonia or silicate of soda may be used. These, however, will affect the brilliancy of the shades to some extent. By using stannic chloride or alum in place of sulfuric acid, the fastness to milling is somewhat improved.

Palatine Fast: The dyeing characteristics of palatine fast dyestuffs are very similar to those of the acid dyestuffs but in their properties they are related to the chrome developed dyestuffs. They are used for dyeing piece-goods, loose wool, shoddy, tops, knitting and carpet yarns and fully planked hat bodies. Carbonized goods may be dyed without previous neutralizing. The palatine fast dyestuffs are also well suited for machine dyeing. The dyebath is set according to the depth of shade desired and the ratio of the goods to liquor with 5 to 10% sulfuric acid 96% add the well dissolved dyestuff, enter the goods at 105°, run for 10 minutes, raise to the boil for ½ hour and boil for about 1½ hours. To exhaust the dyebath completely, the following quantities of sulfuric acid 96% will be required:

approximately 8% for a liquor ratio of 1 : 30
approximately 9% for a liquor ratio of 1 : 40
approximately 10% for a liquor ratio of 1 : 50

With fairly deep shades it is advisable to commence dyeing with only two-thirds of the total quantity of acid, the remaining third being added as soon as boiling point is reached, with the steam turned off. After dyeing, the goods must be thoroughly rinsed, an addition of 5% acetate of soda to the last rinsing bath being advisable.

Quite a large percentage of sulfuric acid is required in order to obtain the full benefit of the all-round fastness of this outstanding color group. Some objections have been raised in the fear that the goods, particularly such containing cotton or rayon effect threads, might be detrimentally affected. The manufacturer has found that by the use of Palatine Fast Salt O solution, it is possible to reduce the quantity of sulfuric acid and to dye the palatine fast colors with sulfuric acid, which is required for ordinary acid leveling dyestuffs, without in any way diminishing the excellent fastness properties. With the addition of Palatine Fast Salt O solution in some cases, particularly blacks and navy blues, it has been found that the fastness to decatizing and perspiration as well as fastness to rubbing of full shades, have been considerably improved.

DYEING FROM AN ACID BATH AND DEVELOPING WITH METAL SALTS

Afterchroming Process: We next come to the group: Chrome colors—and we shall discuss the afterchroming process first. This method is based on the property of certain dyestuffs to be absorbed by the wool from an acid

bath and being converted into very fast dyeings by a subsequent treatment with bichrome or chromate of soda, alum, chromic fluoride and sulfate of copper. Bichrome or chromate of soda is most frequently resorted to because it is suitable for a large number of dyestuffs, at the same time producing very fast dyeings. For this reason, chrome developed dyestuffs are exclusively used in the fast dyeing of loose wool, tops, yarn and piece-goods wherever fastness to the various manufacturing processes and wearing is essential. The afterchroming process is as follows:

Set the dyebath at 120° F. with

10 to 20% Glauber salt crystals
3 to 5% acetic acid 30%

and the well dissolved dyestuff. Raise to the boil slowly, boil for ½ to ¾ hour, then add, if necessary, another

3 to 5% acetic acid 30% (or 2% sulfuric acid 96%) and boil for another ½ to ¾ hour until the bath is exhausted. Then cool down somewhat, slowly add the dissolved bichrome or chromate of soda and once more raise the temperature to the boil and boil for another ¾ to 1 hour to develop the shade.

Small deviations in shade may, after developing with bichrome, be rectified in the same bath with chrome resisting acid dyestuffs. When deviations are, however, very pronounced, the chrome bath is cooled down to 120° F. and the goods brought to shade by an addition of the same dyestuff as originally used. The goods are then slightly chromed.

Owing to the good fastness properties of the chrome developed dyestuffs, dyeings which have turned out unlevel or too dark are difficult to rectify; some dyestuffs may be partly stripped with Decroline, Decroline Soluble Conc. or Decroline AZA. The effect of a stripping operation with the above auxiliaries varies, however, on different colors and it is advisable to make trials before stripping the lots. In most cases, the maximum quantity of stripping agent must be used but then the quality of the goods is sometimes impaired so that re-dyeing a deeper shade may possibly be more economical and particularly more satisfactory.

Simplified Chrome Dyeing: With certain chrome dyestuffs, the dyeing operation may be simplified by dyeing in the presence of chrome, or, still better, metachrome mordant. This mordant possesses the property of liberating acid by slow and uniform decomposition, thus effecting very gradual absorption of the dyestuff by the wool. The chrome acid which is liberated at the same time as the other acid chromes the dyestuff on the fiber in such a way that a premature chroming of the dyestuff still remaining in the dyebath is avoided and thus a precipitation of the dyestuff is impossible.

As a rule, as much metachrome mordant as dyestuff is used but never less than 3% and not more than 8% of the weight of the goods.

An addition of a small quantity of Leonil S (½%) to the dyebath helps leveling. To prevent the chrome exerting any deleterious effect on the quality of the wool, Protectol may be added to great advantage. The wool then retains its soft handle and its elasticity, fully maintaining at the same time the good spinning properties of the fiber. For full shades, 2 to 3% sulfate of ammonia may be added to the dyebath to ease exhaustion. An addition of acid to the dyebath is recommended only when a reduction in the time of dyeing seems advisable; in that case, the acid must not be added too soon because a premature addition of acid may result in inferior fastness to rubbing. The metachrome colors have been well introduced for yarn dyeing, partly in the vat (tub) but particularly for machine dyeing, and they are also applied a great deal for dyeing worsted yarn for ladies' and men's piece-goods and for yarns, used in the hosiery industry, possessing very good fastness to sea-water.

With regard to solubility and leveling, no difficulties need be feared. Among the group which I shall mention later on, it is only Metachrome Black Blue G which requires particular attention in the dyeing process as same is sensitive to copper and, therefore, its fastness to decatizing is slightly decreased when dyed in copper vessels.

DYEING ON A MORDANT

This method is used particularly for alizarine and other mordant dyestuffs. The mordanting of the material is mostly carried out in a separate bath. By this process, the wool is first mordanted, that is a metallic salt is precipitated on the fiber which forms an insoluble lake with the dyestuff in the subsequent dyeing process. Mordanting is chiefly carried out with chromium or alumina salts. The most used chrome mordant is bichrome and tartar or chromate of soda and tartar, while alum is used for the alumina mordant which is almost exclusively used for the production of bright reds only. The process, dyeing on a mordant, has, to a large extent, been superseded by the more easily dyed chrome developed dyestuffs and more recently by the vat dyestuffs (Helindone).

DYEING ON A CHROME MORDANT

Mordanting and dyeing in a separate bath: The most widely used chrome mordanting process is as follows:

Mordanting: Set the bath with

3% bichrome
2½% tartar or
3% bichrome
1.5% sulfuric acid 96% or
1.5% bichrome
3% lactic acid
1% sulfuric acid

Enter the goods at 160° F., raise to the boil (slowly in the case of lactic acid liquors), boil for 1½ hours and rinse. Hard water must be corrected with acetic acid. In place of tartar and lactic acid corresponding quantities of other assistants such as formic and oxalic acid may be used. Chromate of soda may also be used instead of bichrome. The quantities of bichrome and assistants required vary according to the desired depth of shade. For instance, with pale shades in a bichrome/tartar liquor, as little as 1% bichrome and 3% tartar for full shades. The

mordanting bath may be used again. In that case, only two-thirds of the quantities of bichrome and tartar used in the initial bath are required. The bichrome used for mordanting is, in the boiling, fixed on the fiber in the form of chromium oxide under the reducing influence of the wool fiber but even more satisfactorily in the presence of mordanting assistants which exert a reducing effect.

The bichrome and tartar and other mordanting substances must be dissolved separately or added to the mordanting bath after diluting with water.

The dyeing is carried out as follows: Set the dyebath with 1 to 8% acetic acid 30%, according to the lime content of the water until it shows an acid reaction. Then add the dissolved or pasted up dyestuff, enter the mordanted and rinsed goods at 85 to 100° F., work for ½ hour, raise to the boil, in ¾ to 1 hour and boil for 1½ to 2 hours. During the boiling, gradually add 2.5 to 7.5% acetic acid 30% to exhaust the dyebath.

MORDANTING AND DYEING IN ONE BATH

Goods which are not very sensitive may be mordanted and dyed in the same bath; in that case, the bichrome/lactic/sulfuric acid or the bichrome/formic acid mordant is used because these fix the bichrome on the fiber almost perfectly. Set the bath with

1½% bichrome
3% lactic
1% sulfuric acid,

enter the goods at 105° F., raise to the boil in ½ hour and boil for ¾ to 1 hour. When the bath is exhausted, cool down to 105 to 120° F., neutralize with ammonia, add the dissolved dyestuff and raise to the boil slowly. After boiling for ½ hour, gradually add 3 to 5% acetic acid.

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• PHOTOGRAPHS, ANNUAL BANQUET

Persons who desire to obtain a photograph of the Annual Banquet of the American Association of Textile Chemists and Colorists, held in Chattanooga on December 7th, similar to that which appeared in the December 16th issue of the AMERICAN DYESTUFF REPORTER may do so by writing to the Stokes Studio, Chattanooga, Tenn. The price is $1.00, plus 10c for packing and postage. The photograph measures 7½ by 20".

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• NICKEL-CLAD STEEL

The Lukens Steel Co. has recently issued a 24 page publication concerned with the uses of Lukens Nickel-Clad Steel. In addition to a description of its general properties, illustrations are given of its specific uses including textile uses such as for dye liquors. Dyeing machines of the James Russell Boiler Works, Leslie & Elliot Co., James Hunter Machine Co. and Grand Rapids Textile Machinery Co. are shown. Copies of this bulletin are available upon request.

Technical Notes—

(Continued from page 730)

One may also start with a mono- or diamino-anthanthrone, and by diazotization and use of the Sandmeyer reaction convert it to the corresponding iodine derivative. The iodo-substitution products may then be chlorinated or brominated in any feasible manner desired; e.g., iodo-anthanthrone, heated with sulfuryl chloride, gives a scarlet chlor-iodo-anthanthrone. Or, still further, one may start with the dinaphthyl-dicarbonic acid or its derivatives, and accomplish the ring-closing and iodination in the same operation, by heating with sulfuric acid and iodine, etc., the dinaphthyl-dicarbonic acid and derivatives, for example, perhaps being halogen derivatives to begin with.

Six examples are given.

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Vat Dyestuffs (Anthraquinone Series)

German Patent No. 499,350 (*June* 5, 1930)—*I. G. Farben-Ind. A.-G.*—The process protected by the present patent appears to be a quite new procedure. It consists in heating 2-amino-3-cyan-anthraquinone in inert solvents, in the presence of copper or copper compounds. Derivatives and substitution-products of the amino-cyan-anthraquinone may, of course, also be used. The products are remarkable for their very difficult solubility in the hot solvents usually employed in working with vat dyestuffs—nitrobenzene, aniline, etc.; the reaction-products separating out as formed, in the crystalline condition. They are soluble to some extent in conc. sulfuric acid, sufficiently to give a colored solution—a yellow, the substance being as usual precipitated upon dilution of the acid.

In the example given, reference is made to G. P. No. 275,517, for the preparation of 2-amino-3-cyan-anthraquinone. Of it, 1.5 parts are dissolved in 7.5 parts of quinoline, the solution brought to the boil, and 0.04 parts of cuprous cyanide added. The mixture is further boiled, the product precipitating out from the boiling solution in the form of fine orange-yellow needles. Boiling is continued as long as the deposit increases in quantity, the product being then filtered off, and washed with alcohol. The yield is good—1.3 to 1.4 parts by weight.

Of this product, the hydrosulfite vat is yellow-brown; cotton dyed in it is of a handsome orange-yellow color. The products in general may serve as vat dyestuffs, or may be used as intermediates for further working up.

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Vat Dyestuffs (Benzanthrone Series)

German Patent No. 497,825 (*May* 14, 1930—*I. G. Farben-Ind. A.-G.*—In this process, the original materials are 2-N-pyrazole-anthronyl-benzanthrones, substituted in the bz-1-position negatively; which are subjected to caustic fusion. As benzanthrone seems to be the real nucleus involved, in spite of the complex substitution involved, it appears best to group the products under the benzanthrone series provisionally.

In the example given, 2-chlor-bz-1-nitrobenzanthrone is condensed with pyrazole-anthrone. The product, 2-N-pyrazole-anthronyl-bz-1-nitrobenzanthrone, is added to a paste of caustic potash and alcohol (30 parts of the intermediate to 200 parts of caustic potash plus 200 parts of alcohol) which has been brought to 110° C. The mixture is stirred at this temperature as long as dyestuff formation increases, when it is poured into water and aerated to precipitate the product. The product may be purified by crystallization from nitrobenzene or sulfuric acid, and forms bronzy needles, soluble in sulfuric acid with a blue color. Cotton is dyed a clear reddish-violet (the vat is blue). The tones are modified when the original substances are variously substituted.

Azo Pigments (Naphthol AS Series)

German Patent No. 490,882 (*February* 3, 1930) (*addition to G. P. No.* 467,545 *of June* 8, 1924)—*I. G. Farben-Ind. A.-G.*—In the original patent, a process was protected, involving the coupling, on the fiber as usual, of 2-hydroxy-3-naphthoic beta-naphthalide with diazotized amines containing substituting groups in the 2-5-position to the amino-group, one of the substituting groups being chlorine. The present extension covers the formation of the same azo pigments, but as pigments in substance instead of upon the fiber, by coupling as usual, the mixture also containing Turkey-red oil in order to produce a more finely divided product. The pigment is filtered off, washed well, and preserved in paste form, to insure it against aggregation, as would be the case if it were dried. It is employed as usual to form lakes of clear red tone, well adapted for the coloring of rubber goods, since it is stable toward vulcanization. (The amine used in the example given is 4-chlor-3-amino-toluene, or 2-chlor-5-methyl-aniline.)

Blue Acid Dyestuffs (Triphenyl-Methane Series)

German Patent No. 490,377 (*January* 25, 1930)—*I. G. Farben-Ind. A.-G.*—The present synthesis starts with the already used benzaldehyde-2-4-disulfonic acid. This is condensed in the usual way (e.g., by refluxing with dilute mineral acid) with aromatic amines, whose amino-group has been substituted by propyl, butyl, or other aliphatic radicals, the alkyl radical located in the amino-group being of the iso form. Such alkylated amines are easily prepared by reaction of the amine with 2-chlor-propane, 2-chlor-butane, etc. The leuco-compounds produced are oxidized to the dyestuff as usual.

For example, benzaldehyde-2-4-disulfonic acid is refluxed in dilute sulfuric acid with 2-mono-(1'methyl-propyl)-amino-1-methyl-benzene (i.e., o-toluidine which has been condensed with 2-chlor-butane) and the leuco-compound which separates out is oxidized with bichromate, in the presence of oxalic acid and sulfuric acid. The dyestuff is then salted out.

The products give level dyeings, which are clear and bright, even under artificial light.

Vat Dyestuffs (Benzanthrone Series)

German Patent No. 500,324 (*June* 20, 1930) (*addition to G. P. No.* 489,957 *of May* 21, 1927)—*I. G. Farben-Ind. A.-G.*—The original patent protects the production of black vat dyestuffs, by treating 1-anthraquinonyl-6-amino-benzanthrone with alkaline condensing agents The present supplementary patent extends the process to 1'-anthraquinonyl-2-amino-benzanthrones. For example, 1'-anthraquinonyl-2-amino-benzanthrone itself, prepared by condensation of 1-amino-anthraquinone with 2-chlor-benzanthrone, is added slowly, with stirring, to fused caustic potash at temperatures between 230° and 300° C. In order to effect thorough mixing, it is well to dissolve the crystalline anthraquinonyl-amino-benzanthrone in conc. sulfuric acid, and to pour the solution into ice-water, the precipitated product, in the form of a very finely-divided solid, being then filtered off and washed well. The stirring during the addition to the caustic must be thorough. The mixture is then held at the temperature chosen as long as the quantity of product increases then cooled, dissolved in water, and the solution boiled until the dyestuff has completely separated; this is then filtered off, and washed well with hot water.

The product is black, in the paste or dry form, dissolves in conc. sulfuric acid with a bluish-violet color, and this solution changes to a red-brown on addition of a few drops of nitric acid. Its vat is blue, and dyes cotton a fast black.

The best temperature for the fusion depends upon the wetness of the anthraquinonyl-amino-benzanthrone (which evidently is considered only as in the precipitated form); if the paste is rather wet, the optimum is about 270° C. or higher; if only moderately damp, 230° to 250° C.

Six examples are given.

Our Actual Knowledge of the Structure of the Sulfur Dyestuffs

T. S.—TIBA 11, 255 (1933).—An interesting and refreshing resumé of the methods of formation and the probable structure of the sulfur dyestuffs, illustrated by a good many structural formulae, with a closing section upon the methods of sulfurizing the fundamental intermediates. Numerous references to earlier papers and publications are given. The paper from its nature cannot be abstracted, but is well worth looking over for one who wishes a broad, and yet quite detailed, account of the group. Though we have worked very much with many of the intermediates and processes mentioned, it has been a pleasant paper to read.

The Phenomena of Bleaching (Hypochlorite)

L. B.—TIBA 11, 251 (1933).—A paper devoted to hypochlorite bleaching alone, well written and interesting, from the theoretical side: advancing little or nothing new, but discussing the subject carefully.

● COTTON TESTING EQUIPMENT

A wrapping machine and special tensile jaws, for testing cotton by the Chandler Bundle method, are described in Bulletin 310, just issued by the American Instrument Company, 8010-8020 Georgia Avenue, Silver Spring, Md. The recent adoption of this method as a tentative standard by the A.S.T.M. is said to have made the method one of great importance to the textile industry.

The bulletin also describes the Flexometer, for testing flexural properties of fabrics, the Air Permeameter for testing permeability to air, and the Compressometer for determining the compressibility and compressional resilience of pile and other fabrics.

A copy of the bulletin will be sent on request.

● PERKIN MEDAL

The Perkin Medal of the Society of Chemical Industry will be presented to Professor Warren K. Lewis at a meeting of the Society on January 10, 1936, held jointly with the American Chemical Society. Professor Lewis is on the Faculty at the Massachusetts Institute of Technology. The award has been made in recognition of his creative activities as the father of modern chemical engineering and his training of and inspiration to many of the present and potential leaders in the profession. Professor Lewis will present a paper entitled "Application of Physical Data to High Pressure Processes." Dr. George A. Burrell of the Burrell-Mase Engineering Co. will speak on the subject of the Medalist and Professor Marston T. Bogert of Columbia University will make the presentation of the Medal. The meeting will be held at 7:45 p.m. at the Chemists' Club, 52 East 41st Street, New York City. A dinner will be held preceding the meeting, starting at 6:15 p.m.

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The rate for "Position Wanted" advertisements in this column is 2 cents a word—with a minimum of 50 cents per insertion. For all other types of advertisements—i.e., help wanted, machinery or supplies for sale—the rate is $5.00 per column inch or less per insertion.

WANTED A SECOND HAND FADE-OMETER in good condition. Write Box No. 879, American Dyestuff Reporter.

POSITION WANTED—Experienced chemist and dyer on acetate rayon and silk will be available after the first of the year. Formerly connected with two of the largest organizations in the dyestuff and dyeing industry. Can furnish excellent references. Forty years of age, married, and willing to go anywhere. Box No. 880, American Dyestuff Reporter.

SALESMAN WANTED—Position open for experienced salesman to cover the southern states selling well known and extensively advertised line of textile chemicals, oils and sizes. Require a man having mill experience familiar with use and application of these products and capable of demonstrating. Write in detail. Box 872, American Dyestuff Reporter.

POSITION WANTED — Dyestuff Salesman—Will consider new connection first of year with reputable manufacturer Dyestuffs and allied products. Associated past several years with well known firm. Have excellent textile plant contacts, will furnish references as to selling ability, character, etc. Southern New England territory preferred. If interested will arrange for personal interview. Write Box No. 873, American Dyestuff Reporter.

POSITION WANTED—Man, 32 years old has had six years experience with New Jersey's largest dyer of synthetic fabrics, also weighted and pure dye silks. Also 4 years selling experience in textile field. Wishes to make connection with dyer, with whom this experience can be put to good use. Write Box No. 876, American Dyestuff Reporter.

POSITION WANTED—Textile chemical directors, will you let a man prove his worth to you? Organic chemist, M.I.T. '35 thorough technical background for development and research. Interested especially in rayon dyeing and finishing. Write Box No. 877, American Dyestuff Reporter.

POSITION WANTED—Eleven years as production chemist and department supervisor with United Piece Dye Works, specializing in boil-off, dyeing and bleaching of cotton, silk, rayon, acetate and mixtures. Graduate of Philadelphia Textile School, 1924. Write Box No. 878, American Dyestuff Reporter.

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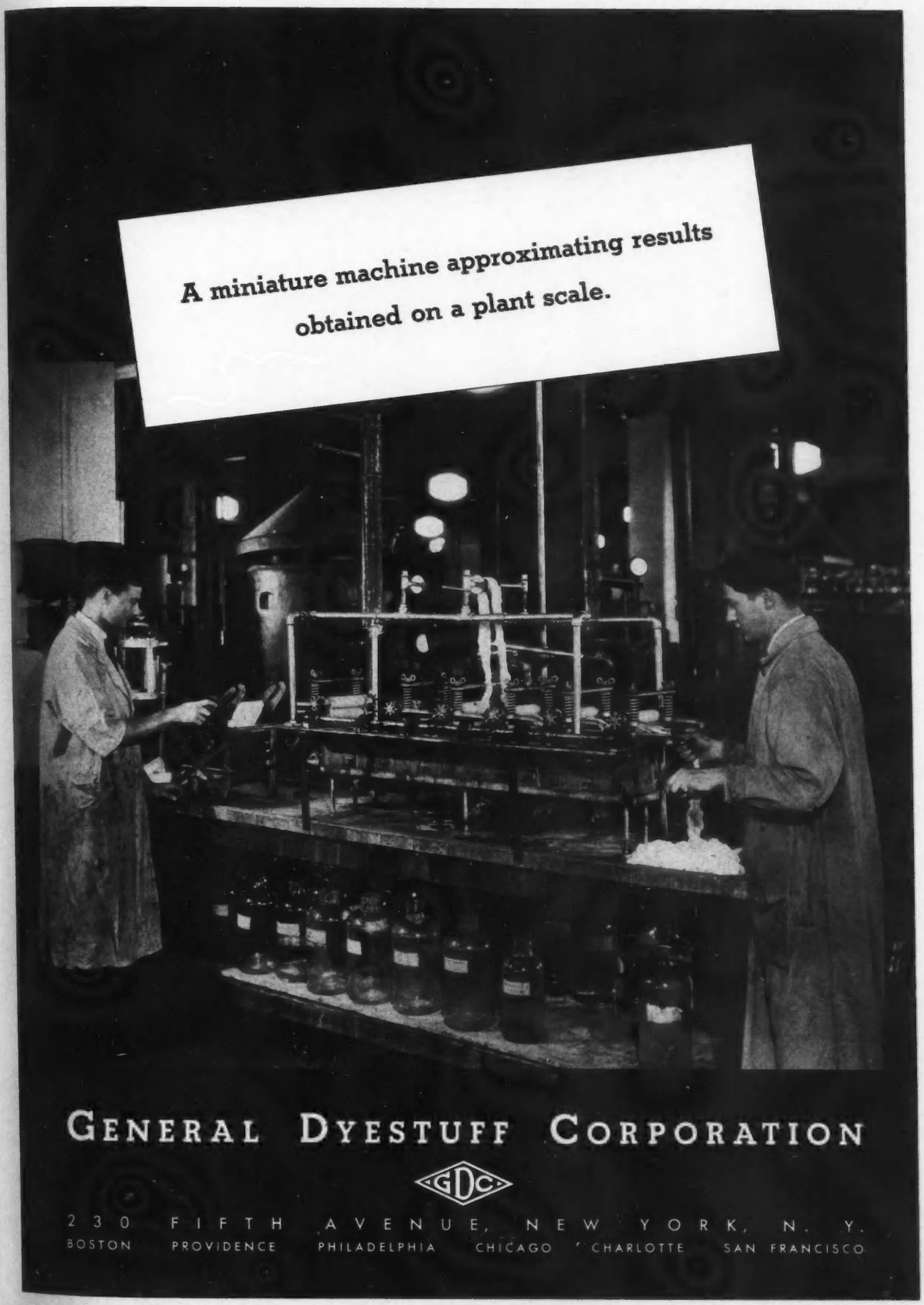
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When it is made soluble, Yarmor Steam-distilled Pine Oil is a product of exceptional merit for the textile processing industry. It has proved of great value as an efficient and economical aid in the production of cotton goods, woolens, worsteds, rayon, and silk.

By using a soap concentrate to pretreat cotton goods, followed by a soluble Yarmor Pine Oil kier assistant in the kier boiling operation, you can obtain clear, permanent whites.

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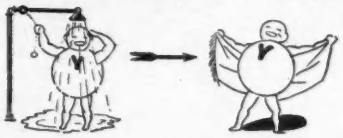

Fulling soaps, containing Yarmor made soluble, rinse easily, quickly, and thoroughly. This helps to eliminate rancidity in storage. Soluble Yarmor also helps by retarding precipitation of insoluble lime soaps on stock.

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When a plain soap method was used in a two-bath process for degumming silk, the boil-off loss was 24.6%. When a Yarmor soluble pine oil soap was used, the boil-off loss was 23.9%. Both of these baths removed practically all of the gum, but it was necessary to use far less of the soap containing Yarmor Pine Oil than plain soap.

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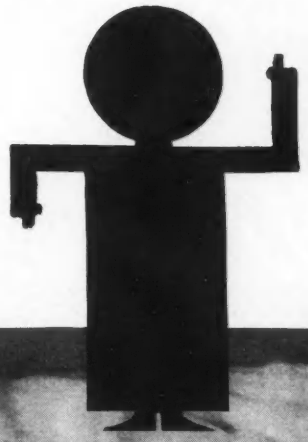

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Official Publication of the American Association of Textile Chemists and Colorists

THE OBJECTS OF THIS ASSOCIATION ARE:

"To promote increase of knowledge of the application of dyes and chemicals in the Textile Industry.

"To encourage in any practicable ways research work on chemical processes and materials of importance to the Textile Industry.

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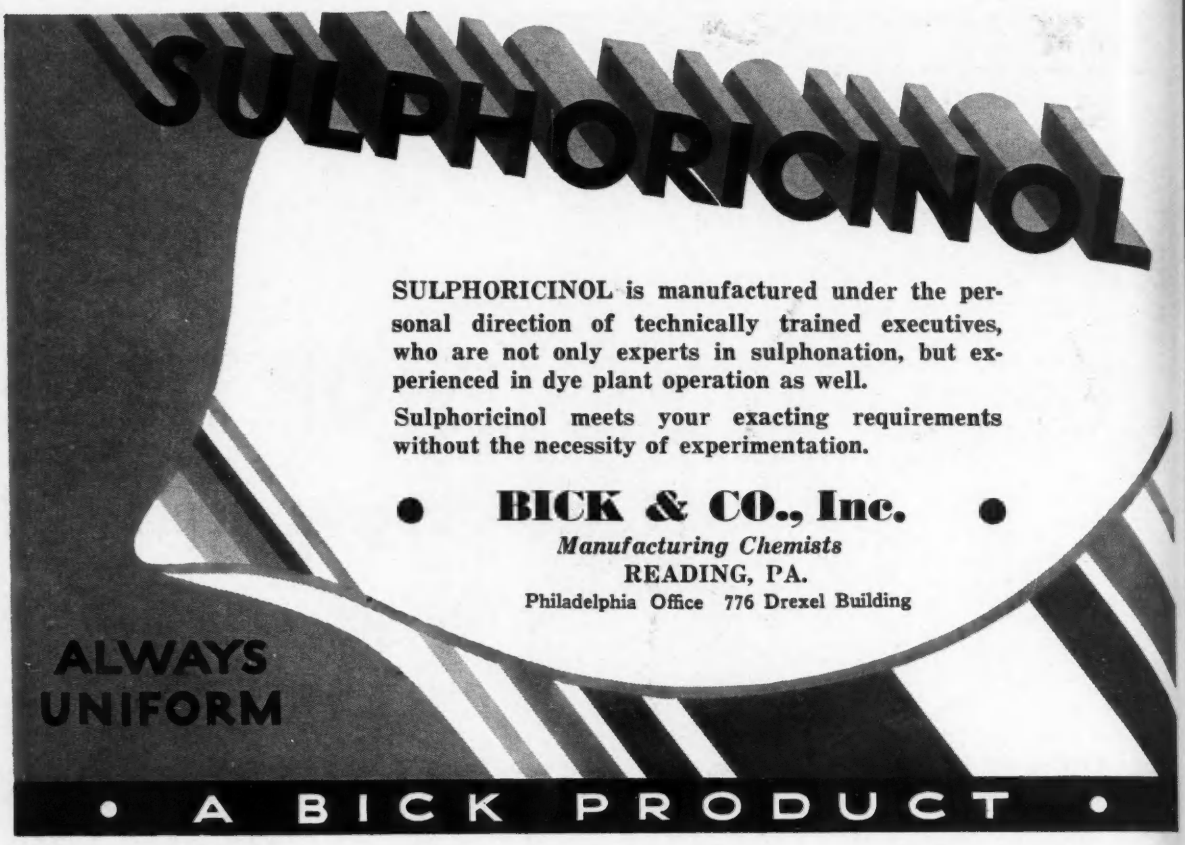
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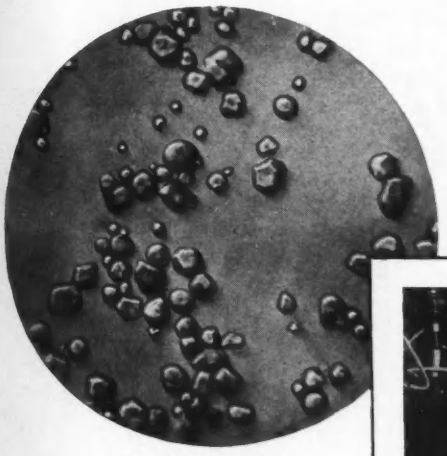

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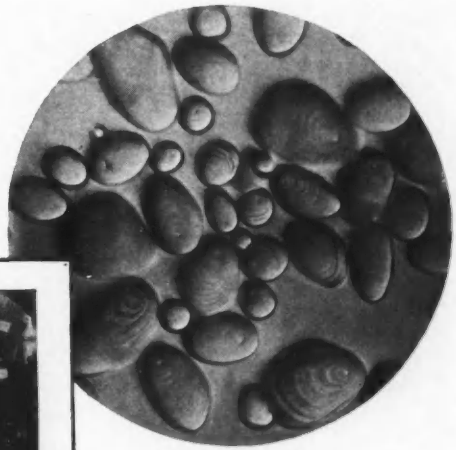

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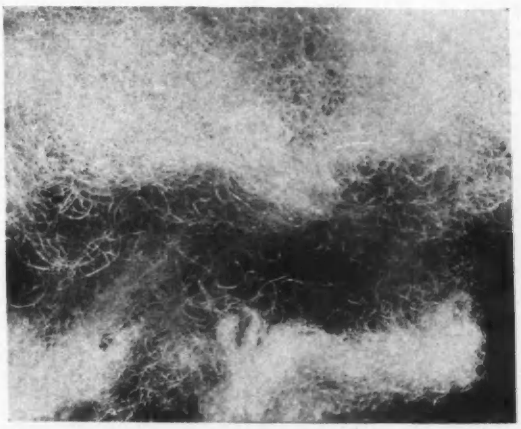

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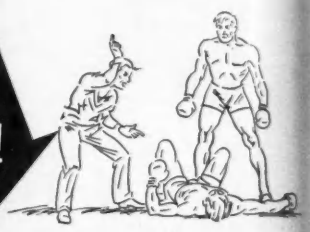

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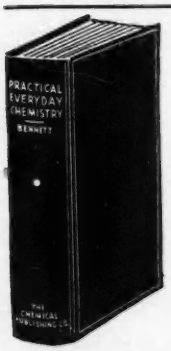

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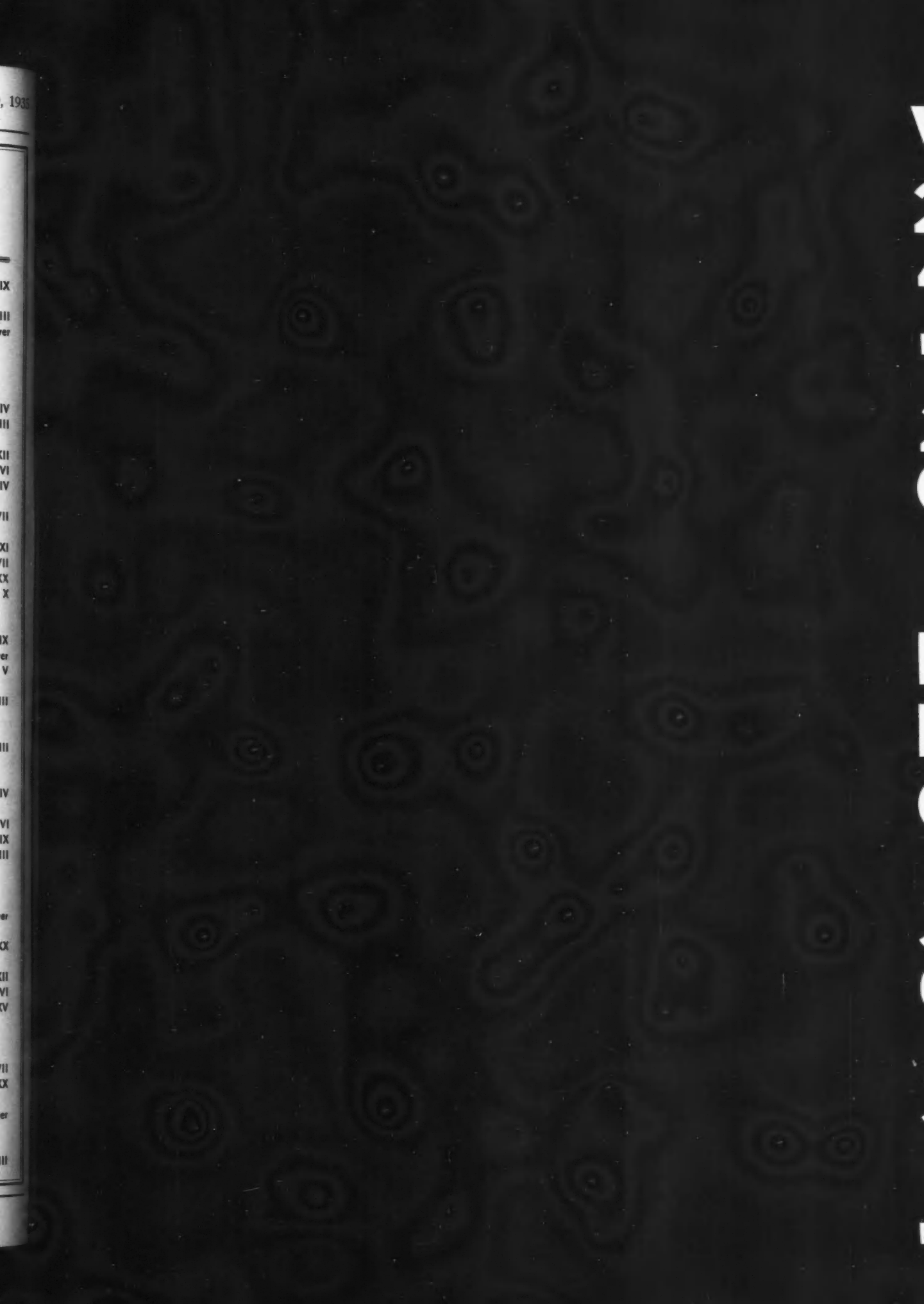
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